

though *B. brachyurus*, like *B. swainsoni*, has only three primaries emarginated. The two differ as follows:

B. swainsoni.—Wing more than 13.50 inches; difference between tips of longest primaries and those of longest secondaries (tertiaries) much more than one-third the length of the wing. Third and fourth quills longest; second longer than fifth; first much longer than eighth (sometimes equal to seventh). Second, third, and fourth quills with outer webs sinuated; inner web of fourth quill never with indication of sinuation.

B. brachyurus.—Wing less than 13.50 inches; difference between tips of longest primaries and those of longest secondaries less than one-third the length of the wing. Third, fourth, and fifth quills longest; second shorter than fifth, usually about equal to sixth (rarely a little shorter); first shorter than eighth (usually a little shorter than ninth). Second, third, fourth, and fifth quills with outer webs sinuated; inner web of fourth quill usually more or less sinuated.

EARLY IRON MANUFACTURE IN VIRGINIA—1619-1776.

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[Accompanying specimens of slag from the old foundry at Falling Creek, Va., established in 1619. Donation No. 9378.]

To Virginia, the first of the English settlements in America, belongs the honor of inaugurating within her limits as a colony that most important industry, iron manufacture.

The London Company, it is exhibited, contemplated a variety of manufacturing enterprises from the very beginning of its authority; prominent among them was that of iron.

In 1610, Sir Thomas Gates testified before the council of the company at London that in Virginia "there were divers minerals, especially 'iron oare,' lying upon the surface of the ground, some of which having been sent home had been found to yield as good iron as any in Europe.*

Under a new administration of its affairs, the London Company, in 1619, after twelve years of unprofitable expenditure, sent to Virginia a large body of emigrants, including workmen, and materials for some new branches of industry. These embraced no less than one hundred persons skilled in the manufacture of iron, with the design of erecting in the colony three iron works. Of these, one hundred and ten were from Warwickshire and Staffordshire and forty from Sussex, and were selected for their skill and industry.†

* True Declaration of Virginia, 1610; Force's Tracts, Vol. III, p. 22.

† A Declaration of the state of the Colonies, &c., 1620, p. 10; Stith's History of Virginia, Book IV, p. 176.

A part of the funds liberally contributed in England about the same time for a college at Henrico, for the education of native and colonial youth, was appropriated by the treasurer, Sir Edwin Sandys, to the erection of iron works, in the expectation of deriving a revenue from that source. Works for smelting the ore were erected in 1619 on Falling Creek, a tributary of James River, in Chesterfield County, about seven miles below the city of Manchester. Most sanguine hopes of profit from this undertaking were cherished.

Three of the master workmen having died, a re-enforcement of twenty experienced hands was sent over in 1621, accompanied by Mr. John Berkeley and his son Maurice, as skillful persons to superintend the operations. A mine of the brown iron ore in the neighborhood was opened and found to yield "reasonably good iron."* But the jealousy and enmity of the native inhabitants had unfortunately been aroused. In an hour of fancied security, when all suspicions of hostility had been lulled by the friendly protestations of the Indians, on the morning of Friday, March 22, 1622, a general attack was made by the savages upon the settlements in the colony, and 347 persons slain. Of those engaged at the iron works at Falling Creek all perished save a boy and girl, who fled to the bushes for safety.†

The iron works being demolished, so great was the discouragement consequent that a long period elapsed before the useful manufacture was again attempted in Virginia. A writer from the colony in 1649 published that "an iron work erected would be as good as a silver mine."‡

The exportation of iron from the colony was forbidden by an act of the assembly in 1662, on penalty of ten pounds of tobacco for every pound of iron exported, and the prohibition was renewed in 1682.

Col. William Byrd, the first of the name and family in Virginia, obtained, April 20, 1687, a grant of 1,800 acres in Henrico County, on the south side of James River, within the limits of which was included the site of the fated iron-works on Falling Creek. On the 29th of October, 1696, he obtained a patent for 5,644 acres lying contiguous thereto, giving as a reason for such action, in a note prefixed to his record of his landed possessions, that "there having been iron-works on Falling Creek in the time of the company, and Colonel Byrd having an intention to carry them on, and foreseeing that abundance of wood might be necessary for so great a work, he took up a large tract," &c., as above. He died on the 4th day of December, 1704, and it is not known that either he or his son and heir, of the same name and title, ever instituted any further steps towards the revival of the works at Falling Creek, as apparently projected.§

* Beverley's History of Virginia.

† Stith, Book IV, p. 218; Bishop's American Manufactures, I, pp. 468-469.

‡ A Perfect Description of Virginia, London, 1649, Force, vol. ii, No. 8.

§ MS. Deed-Book of William Byrd.

Governor Alexander Spottswood appears to have been the first to break the spell of dormancy in the iron industry in Virginia, which he did by the establishment of a smelting furnace on the Rappahannock River near the present site of Fredericksburg, and of a very complete air-furnace at Massaponax, fifteen miles distant, on the same river, and near the site of his settlement, Germanna.

In an account-book (1726-'30) kept by Rev. Robert Rose, who was an agent for Governor Spottswood, there are numerous entries of fire-backs cast at Germanna which were sold by him. In 1732 there were four furnaces operated on the Rappahannock, in one of which, Principio furnace, Augustine, the father of George Washington, was largely interested; the ore used in it being supplied by him from his plantation at Bridge's Creek, on the east side of the river.*

The Falling Creek tract fell to the possession of Col. Archibald Cary some time prior to the Revolutionary war. Upon it he erected his well-known seat, the name of which became in the records of the period a part and parcel of his personal designation as Archibald Cary, of Ampthill. He erected new iron-works on Falling Creek. "He purchased pigs of iron from Rappahannock, Patowmack, and Maryland. Of these he made bar iron. The profits, however, were so small that he abandoned his forge and converted his pond to the use of a grist-mill about 1760. Nobody then knew of any iron mine convenient to Falling Creek."†

The writer visited Ampthill and Falling Creek in May, 1876. The mansion was then in fair preservation. It is now owned by Mr. John Watkins, of New York.

Falling Creek is about a mile below Ampthill. Its waters still furnish motive power to a grist-mill owned by Mr. H. Carrington Watkins, and known as the Ampthill mill. The creek is but an insignificant rivulet above the mill, but some twenty yards below it widens into a handsome little lake, and some quarter of a mile thence empties into James River.

About sixty yards from the mill, on the western bank of the creek and nearing the river, the writer picked up several small pieces of furnace-cinder, presumptive relics of the iron-works of 1622. The bluff adjacent and incumbent has, it is evident from repeated washings of the soil, nearly covered the exact original site.

On the opposite side of the creek, and to the east of the mill, is clearly indicated the site of the forge of Archibald Cary. Here we found numerous pieces of slag or cinder, some of them fully a hundred pounds in weight, and an irregular area an acre or more in extent, covered

* Iron-making and Coal-mining in Pennsylvania, by Col. James M. Swank, p. 11.

†A marginal note in MS. on a copy of Stith's History of Virginia, Williamsburg, 1747, p. 218, which formerly belonged to Robert Bolling, of Chillowe, author of the Bolling Memoirs.

with finely-broken or comminuted charcoal to the depth of two feet fully; a memorial of the fuel used.

We were informed that about half a mile below Falling Creek, near James River, there is a low piece of ground known to this day as Iron Bottom, where may be found plentifully what is known as bog iron on the surface. It will be recollected that the iron ore already cited as being mentioned by Sir Thomas Gates was described as "lying on the surface of the ground." We have also learned since our visit to Falling Creek that at a point upon its banks distant inward about two miles from the site of the iron-works there are numerous pits some five or six feet in depth, which it is evident from the mineral character of their surroundings furnished the crude ore for the original and ill-starred works.

In June, 1870, a freshet, the result of previous heavy rains, overflowed and broke the dam at a point known as Old Forge, on the Jones branch of the Chickahominy River, in New Kent County, Virginia. Trees were overturned, a building undermined, and a gorge cut, uncovering in its route the remains of an early forge or smelting furnace. The foundation, portions of a chimney, an anvil, a hammer, and six bars of iron were exposed to view—one of the last bearing in raised letters the inscription "B. G., 1741," which were supposed to indicate the place and date of manufacture; the first of which was assumed to have been Bear Garden furnace, Buckingham County, Virginia. The forge is marked on Fry and Jefferson's Map of Virginia, 1765, as Holt's Forge. It must have commenced operations at a period not much later than 1741, if not as early, and was continued until some time during the Revolutionary war.

Tradition assigns to Col. William Byrd (the second) the credit of erecting and first working the forge, and Mr. William H. Christian, of Richmond, states that in his boyhood he was informed by an old negro man, named Guthridge, that his owner, one Jones, who operated the forge until its destruction, stationed him, then a youth, upon an eminence to watch the movements of the British soldiery who were in the section. Their approach being descried, the buildings were hastily fired and earth thrown upon the ruins to conceal the tools, &c. After the war bar iron was produced so cheaply in other sections that no efforts were made to revive the works. A grist-mill being erected in late years near the site of the forge, and driven by water from the pond used for its operations, was first called Providence Mills, but such was the force of custom that the residents of the section would retain the old designation, Forge; hence the new and old name has by common consent and usage been united in the component term Providence Forge.